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ABSTRACT

This module on drugs used in chronic obstructive pulmonary disease (COPD) is intended for use in inservice or continuing education programs for persons who administer medications in long-term care facilities. Instructor information, including teaching suggestions, and a listing of recommended audiovisual materials and their sources appear first. The module goal and objectives are then provided. A brief discussion follows of the structure and function of the respiratory system, drug therapy, the effects of COPD upon the patient, and considerations and suggestions for resident care. This discussion is intended for use as a lecture or participant reading. Other contents include class activity problems and discussion, a worksheet, a diagram of the respiratory system, and a drug chart, all of which are suitable for reproduction for use as handouts. (YLB)

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DRUGS USED in COPD

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Drugs Used in COPD

Instructor Information

The material in this module is to be used as an aid to inservice programs or continuing education classes for participants who are employed in a long term care facility. This module deals with several groups of drugs commonly used to treat Chronic Obstructive Pulmonary Disease. Also included in this module is a brief description of the structure and function of the respiratory system and the effects of C.O.P.D. upon the patient. The drug charts and worksheet may be duplicated for convenience and the participants' information.

Audio Visual Materials

Trainex filmstrips can be borrowed from Vocational Education Services at no charge.

Trainex filmstrips - "What is Emphysema?" AV070037
"Basic Elements of Anatomy and Physiology." AV070044

Drugs Used in the Treatment of Chronic Obstructive Pulmonary Disease (C.O.P.D.)

Goal

Chronic Obstructive Pulmonary Disease (C.O.P.D.) is the most common respiratory problem among geriatric patients. It is the goal of this module to familiarize health workers with the disease process of C.O.P.D. and to provide an understanding of the medications commonly used for treatment.

Objectives

After completion of this module, the participant will:

- Name two groups of drugs used to treat C.O.P.D.
- Describe the actions of these drugs upon the respiratory system
- List three drugs from each group and describe their side effects and interactions with other drugs
- Discuss possible solutions to class activity problems with the instructor
- Describe the physiological effects of C.O.P.D. on the lungs
- Increase word power by defining seven terms

The Respiratory Sytem and C.O.P.D.

Structure and Function of the Respiratory System

The respiratory system consists of:

Conducting passageways which provide means for air to pass:

- Nasal cavities - moisten, filter, warm air (speech)
- Pharnyx - common passage to lungs and digestive system
- Larnyx - voice box
- Trachea - windpipe (4½ inches long) has c-shaped cartilage to keep open
- Bronchi - branches into R and L tree - suspends lungs
- Bronchioles - end of air conducting passageways

Respiratory passageways where actual exchange of oxygen and carbon dioxide takes place:

- Respiratory bronchioles
- Alveolar ducts
- Alveolar sacs
- Alveoli

The respiratory passages are surrounded by numerous arteries, veins and capillaries. Air enters the respiratory passages and terminates in the alveolar sacs, very thin elastic membraned sacs only 1 cell thick. As blood circulates through these sacs, oxygen is picked up by the blood. Carbon dioxide is released to be exhaled. There are approximately 700 million alveoli contained in the tissue of the lungs.

The lungs are 2 cone-shaped organs that are suspended in the chest cavity. They are light, spongy elastic organs that stretch on inhalation and decrease on exhalation. The lungs are covered by a double layered sac filled with clear fluid that prevents friction and rubbing when we breathe. Breathing is both a mechanical and chemical activity, controlled by the nervous system and the balance of carbon dioxide and oxygen in the blood.

C.O.P.D. - Chronic Obstructive Pulmonary Disease

C.O.P.D. is an umbrella term which covers several respiratory diseases:

- Emphysema
- Chronic bronchitis
- Asthma
- Complication of C.O.P.D.

C.O.P.D. develops slowly over a period of years. Patients with C.O.P.D. generally share a common history of repeated or recurring infections of the respiratory tract with a resulting inability to breathe deeply or to completely ventilate their lungs. Repeated infections and/or irritation of the bronchus result in swelling and narrowing of the bronchial tubes. There is an increase in the production of thick mucus and eventual distention of the alveolar sacs with loss of elasticity. A diminished exchange of carbon dioxide and oxygen causes the patient to complain of dyspnea, cough, weakness, and loss of appetite. Because the damage to the respiratory system is irreversible, the medications used to treat C.O.P.D. are given to relieve the symptoms and enable the patient to live a more comfortable life.

Emphysema — a chronic narrowing of the bronchioles which allows air into the alveolar sacs, but prevents all of the air from being exhaled. This condition results in the distention of the alveoli and the lungs enlarge. The patient develops a "barrel chest."

Causes

- Smoking
- Air pollution
- Chronic or asthmatic bronchitis
- Repeated pneumonia

Treatment

- Systemic drug therapy
- Inhalation therapy
- General exercise

Chronic Bronchitis — inflammation of the mucus membrane of the bronchial tree.

Causes

- Follows ACUTE bronchitis
- Complication of sinusitis
- Infection
- Chronic irritation

Treatment

- Antibiotic therapy
- Facilitate removal of secretions
- Inhalation therapy

Asthma — onset of an attack may be gradual or sudden with nasal congestion, sneezing, watery nasal discharge, S.O.B., wheezing

Causes

- Allergies (irritants)
- Emotional factors
- Changes in weather
- Infection

Treatment

- Antihistamines
- Oral nasal decongestants
- Avoidance of precipitating factors

Complications of C.O.P.D.

- Cor-pulmonale — right sided heart failure
- Spontaneous pneumothorax — collapse of lung due to rupture caused by disease process
- Peptic ulcer — 20-25% of patients with C.O.P.D. will have had an ulcer at one time
- Pulmonary embolism — air or blood clot blockage of arteries in lungs

Drug Therapy

General Discussion

Drugs that affect the respiratory system act upon the body in four ways, bringing about changes in

the respiratory center in the brain
the mucus membrane in the respiratory system
the size of the bronchioles
(combating) the allergic reactions manifested by watery eyes, hives, sneezing, runny nose

Types of Drugs Used in the Treatment of C.O.P.D.

Expectorants

Definition — medications which loosen and thin mucus secretions in chronic pulmonary diseases

Adverse effects

- Guaifenesin (Robitussin) — most common: nausea/vomiting (n/v)
- Iodine products — most common: metallic taste, skin rash, n/v
- Terpin hydrate — high alcohol content
- Ammonium chloride — most common: n/v, headache

Bronchodilators

Definition — dilate (expand) respiratory passages to facilitate expectoration of mucus

Adverse effects

- Theophyllin (Tedral) may produce anxiety, dizziness, palpitations, hypotension
- Epinephrine (inhalants) may produce anxiety, palpitations, flushing, hypotension
- Isoproterenol (Isuprel) may produce headache, tremor, flushing, cardiac irregularities

Role of Person Administering Expectorants and Bronchodilators to Residents with C.O.P.D.

- Encourage productive coughing
- Observe resident closely for adverse effects of medications
- Contact physician immediately if resident shows symptoms of heart irregularities, hypo or hypertension and/or agitation
- Give expectorants with a full glass of water to facilitate thinning of excretions

Oxygen Therapy

The main function of the respiratory system is to provide oxygen to body cells and remove carbon dioxide as waste. Abnormalities in this exchange of gases results in the diminished availability of oxygen to the cells of the body. Oxygen should be administered *with extreme caution* in those residents who have C.O.P.D., because a sudden high concentration of 0_2 will turn off the respiration stimulating center in the brain and the resident will stop breathing.

Hypoxia

Cause — oxygen deprivation
Symptoms

- Sudden hypoxia resembles drunkenness
- Long standing hypoxia — fatigue, drowsiness, inattentiveness
- Acute respiratory failure — apprehensiveness, dyspneic, wheezing, possible cyanosis, distended jugular veins and strained neck and accessory muscles used for breathing

Role of Person Caring for Resident in Long Term Care Facility Receiving Oxygen

- Observe resident's respiratory status (chest and abdomen):
  Note rate, rhythm and depth of respirations
  Observe for use of abdominal muscles or neck muscles
- Take vital signs
- Skin and nails
  note color
  note temperature to touch (warm, cool, damp)
- Head and neck
  check jugular veins for distention
  note flaring of nostrils
  look for bluish color around lips or inside oral mucosa
- Check extremities
  note color of legs and feet
  look for swelling or edema

- Observe mental status
  confusion
  anxiety
  restlessness
- Avoid using electrical devices near oxygen
- Post "no smoking" signs on door
- Check skin for pressure sores caused by masks, elastic bands, or tubing
- Frequent mouth and nostril care may be necessary to relieve dryness and crusting

Care of the Resident

Considerations	Suggestions
Observe patient for infection.	Observe sputum; note change in amount, color, consistency.
Help patient to reduce mucus.	An adequate fluid intake will help to thin mucus secretions.
Help patient maintain as optimal level of health as possible.	Help patient to reduce fatigue by resting before and after meals if eating causes dyspnea; exercise and social interaction are important in helping patients maintain healthy attitude.
Protect patient from pulmonary irritants.	Smoking, dust, other patients, or visitors with respiratory infections are dangerous to patients with C.O.P.D.
Help patient keep comfortable position.	Sitting position facilitates chest expansion. Supine position reduces lung capacity by 300 ml.

Class Activity Problems and Discussion

Discuss the following situations with your instructor. Be prepared to explain your answer(s).

Mr. John Whyte, 76, was admitted to the nursing home following hospitalization for pneumonia. He has a history of chronic bronchitis and recurrent respiratory infections. Mr. Whyte appears very thin and weak. His breathing is labored and he is very pale.

Medications ordered by his physician are:

Robitussin 1 tsp. (O) q 3-4 h P.R.N.
Tedral T (O) Q.I.D.

Treatments include:

Inhalation therapy T.I.D.

1. Mr. Whyte's medication, Robitussin, is a(n)
   a. expectorant
   b. bronchodilator
   c. antihistamine

2. Mr. Whyte's weight loss might be due to
   a. his recent hospitalization
   b. the medication
   c. laziness
   d. fatigue

3. Mr. Whyte has a chronic cough producing thick mucus. To help thin the mucus secretions, the QMA could
   a. double his dose of medication
   b. give medication with full glass of water
   c. increase the length of his inhalation [illegible]py treatment

4. At 1:00 you give Mr. Whyte his Tedral. He is very agitated and appears confused and disoriented. Mr. Whyte's confusion might be caused by
   a. reaction to the medication
   b. increased carbon dioxide content in the blood
   c. inability to eat properly

Worksheet

1. Name two groups of drugs used in the treatment of C.O.P.D.

   1. 2.

2. Describe the action of these drugs upon the respiratory system.

3. Name three drugs from each group and describe the side effects and their specific interactions with other drugs.

4. Discuss possible solutions to class activity problems with your instructor.

5. Describe the effects of C.O.P.D.

6. Increase your word power - learn these definitions
   Apnea — cessation of breathing
   Expectorant — medication that thins or liquifies secretions
   Hyperpnea — rapid breathing
   Dyspnea — difficult breathing
   Orthopnea— inability to breathe while lying down
   C.O.P.D. — chronic obstructive pulmonary disease
   Respiration — act of breathing

Class Activity Problems - Discuss with your instructor.

1. Aminophylline, Isuprel, and theophylline are examples of
   a. expectorants
   b. bronchodilators
   c. antihistamines

2. Ammonium Chloride, Robitussin and SSKI are examples of
   a. antihistamines
   b. bronchodilators
   c. expectorants

3. Epinephrine interacts with the tricyclic antidepressants such as Elavil to
   a. lower B/P
   b. increase B/P
   c. decrease appetite
   d. increase appetite

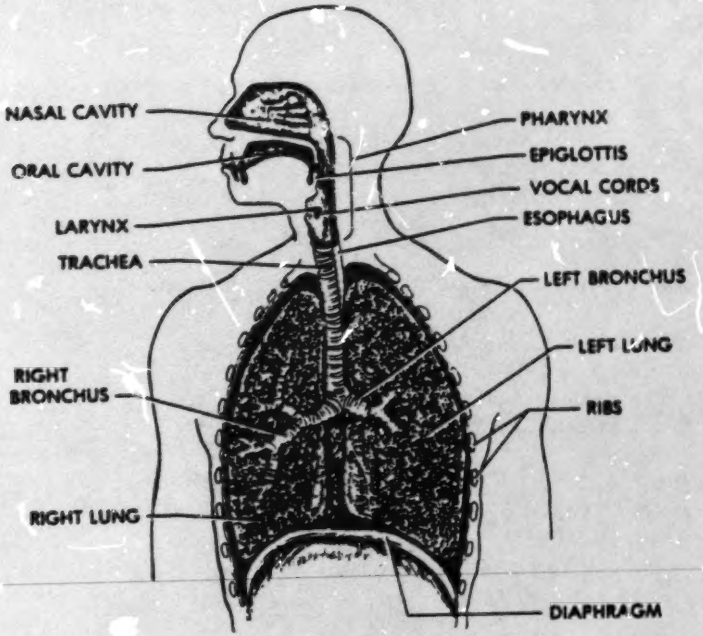
4. A patient with C.O.P.D. is more comfortable in a sitting position. The reason for this is because
   a. mucus drains to the lower portion of the lungs
   b. the sitting position facilitates chest expansion
   c. the supine position increases lung capacity by 300 ml.

5. Orthopnea is
   a. act of breathing
   b. cessation of breathing
   c. inability to breathe while lying down
   d. rapid breathing

6. The patient with emphysema
   a. may completely recover from the disease
   b. can continue to smoke without ill effects
   c. has increased susceptibility to infections

7. The medication Tedral is a(n)
   a. antihistamine
   b. expectorant
   c. bronchodilator

RESPIRATORY SYSTEM



Chronic Obstructive Pulmonary Disease

Normal Bronchioles and Alveolar Sacs

Enlarged Bronchioles

Distended Alveolar Sacs

FUNCTION

REMOVE CARBON DIOXIDE

PROVIDE OXYGEN TO CELLS

Commonly Used Drugs in Treatment of C.O.P.D.

BRONCHODILATORS—Dilate respiratory passages to facilitate expectoration of mucus

Name	Adverse Effects	Interacts With	To Produce	Remember
Theophyllin Aminophyllin Tedral Slo-Phyllin Amesec (oral) (suppository)	Anxiety Restlessness Dizziness Weakness Pallor Palpitations Breathing difficulties Dry mouth Flushing Nausea Insomnia Headache Marked hypotension	**Barbiturates** **Propranolol** (Inderal) **Troleandomycin** (TAO) **Erythromyics** **Furosmide** (Lasix)	Increased side effects	Warn elderly patients of dizziness when starting medication.
Epinephrine Bronkaid Mist Primatene Mist (Inhalants)	Same as above	**Trycyclic anti-depressants** Amitriptyline Impramine Tofranil Norfranil Sinequan	Severe hypertension	Use with extreme caution in patients with bronchial asthma and heart disease.
		Propranolol Inderal	Bradycardia	
Isoproterenol Hydro-chloride Isuprel Praternol	Headache Tremor Flushing of face Cardiac arrhythmias Bronchial edema and inflammation	**Propanolol** Inderal	Blockage of effects of both drugs	Tablets must not be chewed or broken. Do not give at bedtime — interrupts sleep.
Comb. theophylline, and ephedrine amobarbital Amesec	N/V Nervousness Insomnia Tachycardia	**Propranolol** Inderal	Blockage of effects of both drugs	Should not be given to patients with heart damage, high blood pressure or overactive thyroid.

Commonly Used Drugs in Treatment of C.O.P.D.

EXPECTORANTS—thin and loosen mucus secretions to facilitate expectoration.

Name	Adverse Effects	Interacts With	To Produce	Remember
Guaifenesin Robitussin Anti-Tuss Sedatuss Tussin DM	N/V Epigastric pain Soreness of mouth Swelling of eyelids Sneezing Headache Confusion Skin rash	None significant		Advise patient to take with glass of water.
Potassium iodide KI-N Kosol Pima SSKI	Same as above Goiter	Lithium carbonate	Hypothyroidism	Prolonged use of iodine products can lead to hypothyroidism. In patients sensitive to iodides, and in hyperthyroidism, iodine induced goiter may occur.
Terpin hydrate Creoterp Terp	None	None	None	Has high alcohol content. Do not give on empty stomach, peptic ulcer or severe diabetes. History of drug and alcohol abuse necessitates caution.
Ammonium chloride Ammonium Chloride	Headache Confusion Excitation alternating with coma Renal impairment Thirst	**Spironolactone** Aldactone	Increased diureses acidosis	Watch for increased output when used with diuretics.